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SOUTHWESTERN JEFFERSON COUNTY, KENTUCKY, LOCAL FLOOD PROTECTION--ETC(U)
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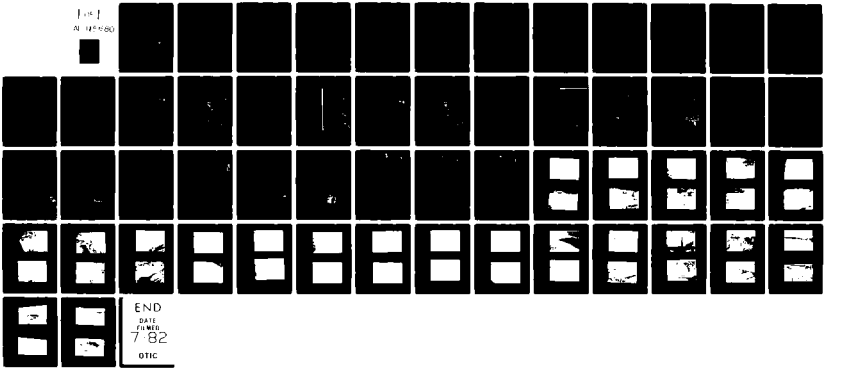

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REPORT DOCUMENTATION PAGE

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1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A115 680
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE (and Subtitle) Supplement No. 5: Southwestern Jefferson County, Kentucky--Local flood protection project.	5. TYPE OF REPORT & PERIOD COVERED Foundation Report
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s) ~~DACW27-79-C-0100~~ DACW27-81-C-0125
9. PERFORMING ORGANIZATION NAME AND ADDRESS USAED Louisville	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
CONTROLLING OFFICE NAME AND ADDRESS USAED (CD-I) Louisville	12. REPORT DATE April 1982
	13. NUMBER OF PAGES 12, 10plans, 22 l. photos
MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report) Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

DISTRIBUTION STATEMENT (of this Report)

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SUPPLEMENTARY NOTES

Construction pumping stations: Riverport pumping station; Lower Mill Creek pumping station; Upper Mill Creek pumping station.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Jefferson County, Kentucky
Riverport Pumping Station
Lower Mill Creek
Flood Protection
Upper Mill Creek
Excavations
Sub-surface drainage

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Results of inspections at three pumping station construction sites in Southwestern Jefferson County, Kentucky.

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FOUNDATION REPORT

SUPPLEMENT NO. 5

SOUTHWESTERN JEFFERSON COUNTY, KENTUCKY

LOCAL FLOOD PROTECTION PROJECT

CONTRACT NUMBERS

DACW27-79-C-0100

DACW27-81-C-0125

CONSTRUCTION PUMPING STATIONS

Riverport Pumping Station

Lower Mill Creek Pumping Station

Upper Mill Creek Pumping Station

April 1982

TABLE OF CONTENTS

1-01 Location of Pumping Stations. The pumping stations covered in this supplement are identified and located as follows:

Name	Levee Section	Station
Riverport	Section 1	433+45
Lower Mill Creek	Section 2	695+85
Upper Mill Creek	Section 3	228+00

Locations of the pumping stations are shown on Plate Numbers 1, 2, 3 and 4.

The purpose of the pumping stations is to pump runoff from rainfall over the levee from the landside or protected side to the riverside during flood conditions.

1-02 Contractors.

1-02a The prime contractor for construction of the Riverport and Lower Mill Creek Pumping Stations was the E. H. Hughes Company of Jeffersonville, Indiana. Mr. Michael P. Murphy was the home office representative directly responsible for the contract. Mr. Don Barrett was the superintendent responsible for all onsite operations throughout the duration of the contract. The E. H. Hughes Company did all concrete work on the pumping stations and installed the Government Furnished Property. Nine firms subcontracted to the prime contractor for various aspects of the construction as follows:

(1) Electric - Strange Electric Co.
Louisville, Kentucky 40215

(2) Plumbing - Southern Plumbing & Piping, Inc.
Louisville, Kentucky 40210

(3) Painting - Payne and Hager, Inc.
Louisville, Kentucky 402024

(4) Roofing - Abram Roofing Company
Louisville, Kentucky 40214

(5) Seeding & Sodding - Jacobi Sodding Service, Inc.
Floyd Knobs, Indiana 47119

(6) Masonry - M and 8 Masonry Construction Co., Inc.
New Albany, Indiana 47150

(7) Fence - Builders Unlimited
Fairfield, Ohio 45014

(8) Reinforcing Steel - National Reinforcing Steel
Louisville, Kentucky 40209

(9) Earthwork (Sitework) - Cundiff Construction Co., Inc.
Louisville, Kentucky 40201

1-02b The prime contractor for construction of the Upper Mill Creek Pumping Station was Batteast Construction Company of South Bend, Indiana. Mr. Eugene Staszewski was the home office representative directly responsible for the contract. Mr. Del Shanks was the superintendent responsible for onsite operations. Batteast Construction Company performed the concrete work on the pumping station. The following firms contracted to the prime contractor for various aspects of the construction:

(1) Site Dewatering - Kelley Contract Dewatering Co.
Wyoming, Michigan 49508

(2) Earthwork - RAM Engineering & Construction, Inc.
Louisville, Kentucky 40232

Chilton Engineering & Construction, Inc.
Louisville, Kentucky 40218

(3) Reinforcing Steel - South Central Erectors
South Bend, Indiana 46617

(4) Guard Rail - Kentucky Guard Rail Company, Inc.
Elizabethtown, Kentucky 42701

(5) Electric - Henderson Electric Co., Inc.
Louisville, Kentucky 40213

(6) Mechanical - Brock Electric Company, Inc.
Clarksville, Indiana 47130

1-03 Contract Supervision.

a. Government personnel responsible for onsite administration of work on Riverport and Lower Mill Creek Pumping Stations were:

(1) Mr. Kenneth Ladd - Resident Engineer
(25 May 1979 through 19 October 1980)

(2) Mr. Gary V. Fitzgerald - Resident Engineer
(20 October 1980 through Completion)

b. Government personnel responsible for onsite administration of work on Upper Mill Creek Pumping Station was Mr. Gary V. Fitzgerald - Resident Engineer

FOUNDATION EXPLORATIONS

2-01 Subsurface Investigations Prior to Construction.

a. Riverport Station - The subsurface conditions were investigated by drive sample, hand auger and undisturbed Denison tube sampling. Borings D-816 and UD-512 were drilled to determine the soil conditions in this area. Locations of the borings are shown on Plate Number 2. Logs of the borings are shown on Plate Number 5. Founding elevation for the structure is 413. The top of Boring UD-512 is elevation 416.8; the bottom of the hole is elevation 366.8. Alluvial, silty to lean clays were encountered between elevations 416.8 and 395± overlying fine to coarse grained sand of glacial outwash origin. The top of bedrock is approximately elevation 327±. Groundwater levels closely reflect Ohio River stage levels at any particular time. Normal pool elevation is 383. An allowable bearing value of 3,000 pounds per square foot is assigned to the sandy materials on which the structure is founded.

b. Lower Mill Creek Station - The subsurface conditions were investigated by power auger. Borings 6, D-1069 through 1072 and D-1541 were drilled to define the soil conditions at the structure site. Location of the borings are shown on Plate Number 3. Logs of the borings are shown on Plate Number 5. Boring D-1070 was drilled in the location of the pumping station. Founding elevation of the structure is 408.5. Top of ground was 426.1 and bottom of hole was 386.1. Silty to sandy clay was encountered overlying sands and gravels at elevation 400.1. Water was encountered at elevation 390.1. An allowable bearing value of 3,000 pounds per square foot is assigned to the founding material.

c. Upper Mill Creek Station - The subsurface conditions at the pumping station were investigated by drive and undisturbed Shelby tube sampling. Borings D-1019, D-1301 and S-1304 were drilled to determine the soil conditions in the area. Location of the borings are shown on Plate Number 4. Logs of the borings are shown on Plate Number 5. Ground elevation is approximately 401± in the area of the borings. From top of ground to 390± the borings indicated silty clay with trace of sand. Below elevation 390±, the soil changes to clayey sands and gravel. Bedrock was encountered at elevation 339± in Boring SDC-1017 which is located approximately 120 feet from the pump plant. Bedrock is the New Albany shale which is a moderately hard carbonaceous shale. Groundwater levels will closely reflect Ohio River stage levels at any particular time. Normal pool for the Ohio River is 383 in this area. A bearing value of 4,000 pounds per square foot had been assigned to the in situ silty clay above elevation 390±. It was originally intended that the pump station would be founded at elevation 406.5± on the in situ silty clay. The preliminary investigative data and preliminary design data are presented in Design Memorandum Number 4. In May 1980 upon digging the inspection trench near

Station 229+ on Levee Section 3, a large quantity of waste fill was encountered. The waste material was composed of heterogeneous materials such as soil, brick, metal, concrete, etc., overlying earlier deposited black flyash. Engineering Division, Geotechnical Branch performed subsequent borings to determine the extent of the waste material. A representative sample of the bore logs are shown on Plate Number 6. Locations of the borings are shown on Plate Number 4. By Modification Number P00008 to Contract Number DACW27-78-C-0048 for construction of Levee Section 3, the waste material was removed from the foundation limits of the pumping station. During this subsurface exploration by Geotechnical Branch it became apparent that the proposed pump station, if constructed on in situ material at elevation 406.5+, would be founded on soft clay. A settlement analysis indicated that if the station was constructed on this material, approximately six inches of settlement could be expected within nine to ten months. A plan was developed to remove this soft material to elevation 388 where in-situ foundation sand would be encountered. The excavation would then be backfilled with sand from the borrow area. The sand from the borrow area would be permitted to contain a maximum of 20% fines passing the #200 sieve. This plan was submitted by ORLED-D to Division Engineer, Ohio River for consideration by letter dated 9 December 1980. By subsequent indorsements, concern was expressed by Ohio River Division's personnel that the refill sand, containing up to 20% fines, would not be as pervious as the in place foundation sand and that the plant would not withstand uplift forces under full flood stage. Ohio River Division's personnel recommended that positive pressure relief for the foundation be incorporated into the design. At a meeting in the Louisville District Office on 29 June 1981 between Louisville District Office's personnel and Ohio River Division Office's personnel, a design was adopted for positive pressure relief composed of lateral drains with the capacity for a maximum computed flow of (37+ CFS), a three feet thick drainage blanket and outlet manholes that permit inspection of the drainage system. The foundation drain system is shown on Plate Number 10. On top of this drainage system which was installed at elevation 388, refill sand from the borrow area would be placed to elevation 406, the founding elevation of the pump plant slab.

2-02 Subsurface Investigations During Construction. Investigations during construction consisted of visual inspection after excavation to the required lines and grades (see paragraph 4-02a). The sand refill required to bring the excavation up to the founding elevation was subjected to both Quality Assurance and Quality Control testing. Along with visual inspections, density and gradation tests were performed.

GEOLOGY

3-01 Topography. The topography of Southwestern Jefferson County in the Ohio River flood area is essentially flat to very slightly rolling. Several terraces, ranging from 10 to 20 feet in height, have been developed during adjustment of the Ohio River to its present channel following the end of the Pleistocene Epoch. Relief ranges from elevation 385 at water's edge to about 435±. Locally, the terrain is broken by narrow tributary valleys entering the Ohio River such as Mill and Pond Creeks.

3-02 Project Geology. The project area is located in an area of deep overburden material of glacial origin ranging from clays to sandy gravels. For the most part, the overburden represents outwash deposits following the Illinoian glacial retreat. Depth of the overburden ranges from 50 to 100 feet. Ten to 20 feet of recent alluvium overlies the glacial outwash deposits along the Ohio River bank and in the small tributary valleys and consists primarily of clays, silts and locally restricted areas of gravelly sand. The outwash is primarily gravelly sand to sandy gravel overlain and interbedded with silts and clays at the higher elevations. Seepage will not be a problem at these sites because of the depth of impervious cover. Bedrock consists of clay shale of the New Providence formation of Mississippian Age. Bedrock relief along the axis of the project ranges from elevation 326 to about 340 except at the south end of the project where the levee ties into bedrock hills.

EXCAVATION PROCEDURES FOR FOUNDATIONS

4-01 Method of Excavation.

a. Riverport - The contract plans and specifications required the pumping station to be built essentially on existing material after excavation to the required grade. The foundation was excavated to the required grade using a tracked front end loader, tracked backhoe and dump truck. The foundation material encountered was a silty clay that provided a firm foundation. No overexcavation or undercut was required; the lean concrete mat was placed directly on the clay foundation at the specified elevation.

b. Lower Mill Creek - The contract plans and specifications required the pumping station to be built essentially on existing material after excavation to the required grades. The foundation was excavated to the required grades using a tracked front end loader, tracked backhoe and dump truck. The foundation material encountered was a lean clay that provided a firm foundation. No overexcavation or undercut was required; the lean concrete mat was placed directly on the clay foundation at the specified elevation.

c. Upper Mill Creek - The contract plans and specifications required that a dewatering system be installed, the ground water table lowered at least five feet below excavation and the foundation be excavated to elevation 388.0. Previous investigations had shown that elevation 388 was the bottom elevation of impervious clay and the top elevation of in-situ pervious sand. The contractor installed an approved dewatering system as shown on Plate Number 7. The contractor requested permission to furnish three each 15 H.P. pumps capable of pumping 600 GPM each and four each 30 H.P. pumps capable of pumping 600 GPM each in lieu of the specified 750 GPM pumping capacity on each well. The request was coordinated with personnel in District Office Construction Division and Engineering Division Geotechnical Branch and approval was given to the request. The location of the 15 H.P. and 30 H.P. pumps is shown on Plate Number 7. Details of the contractor's dewatering well and excavation plan are shown on Plate Number 8. The dewatering wells were installed using the tip elevation of 340. The well points for monitoring the ground water levels were installed with a tip elevation of 380. On 27 October 1981, the contractor began pumping the dewatering wells; ground water elevation was 385±. By 31 October 1981, the ground water had been lowered below elevation 380 and all monitoring wells were dry. The dewatering system kept the ground water below elevation 380 during the entire foundation excavation and refill operation which was completed on 2 December 1981; thus, no ground water problems were experienced during the foundation excavation and refill operations. The earthwork subcontractor excavated the foundation area using a tracked backhoe and top loaded scrapers which hauled the material to the disposal area. The stone filter material and the refill sand from the borrow area were dumped and bladed into place in lifts using a small

dozer. The materials were compacted using a tow type vibratory roller. A backhoe was used to excavate through the stone filter material to permit installation of the lateral drainage pipes. The sand refill material from the borrow area was of exceptional quality considering that it was not a processed material.

4-02 Deviations From Planned Conditions.

a. Upper Mill Creek - When the contractor had excavated to elevation 388 on 6 November 1981, it became apparent by visual observation that the silty clay had not been removed over the entire foundation area. Approximately one-third of the foundation on the south side of the pump plant was acceptable; the clay had been completely removed and the in-situ pervious sand had been exposed. On the north side of the foundation, large seams or lenses of the clay were randomly interspersed in the sand. Some test pits were dug and it was determined that as much as five or six more feet of the clay lenses would need to be removed to expose the sand. The clay lenses were removed by modification to the contract and refilled with sand from the borrow area. Personnel from the Resident Office, District Office Construction Division and Engineering Division Geotechnical Branch inspected the foundation after the clay lenses were removed and agreed that the in-situ sand had been exposed over the entire foundation area as was originally intended. Details of the excavation below elevation 388 are shown on Plate Number 9 and in the photographs in this supplement.

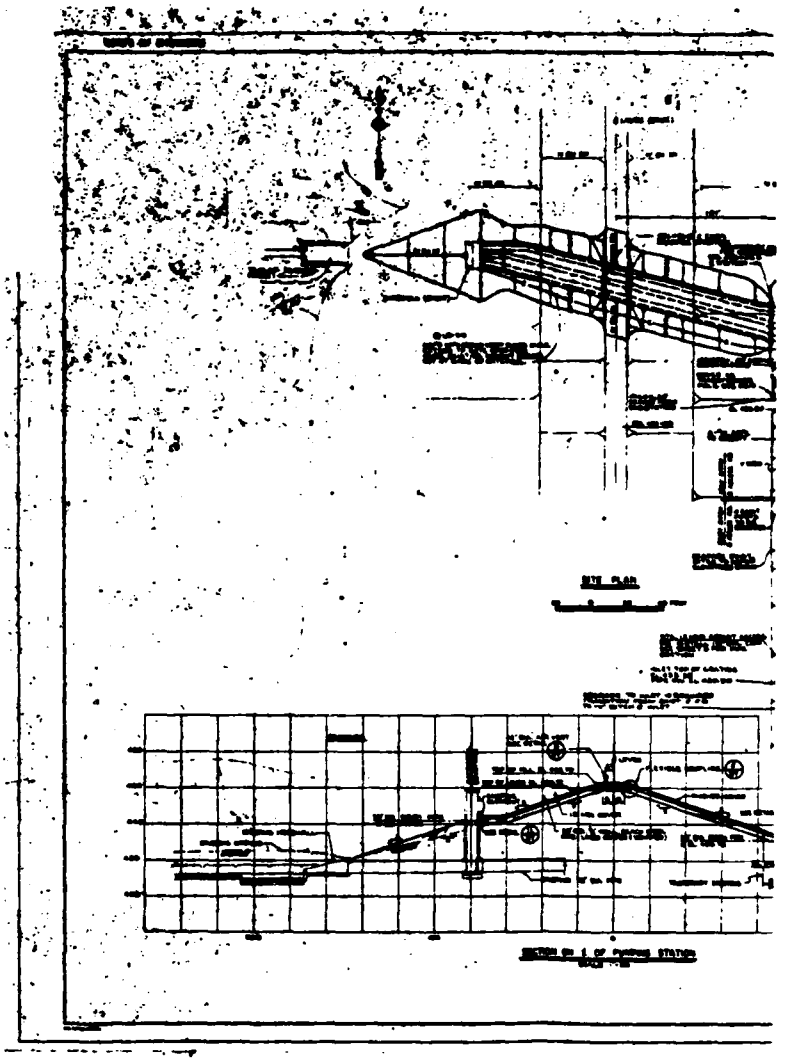
POSSIBLE FUTURE PROBLEMS

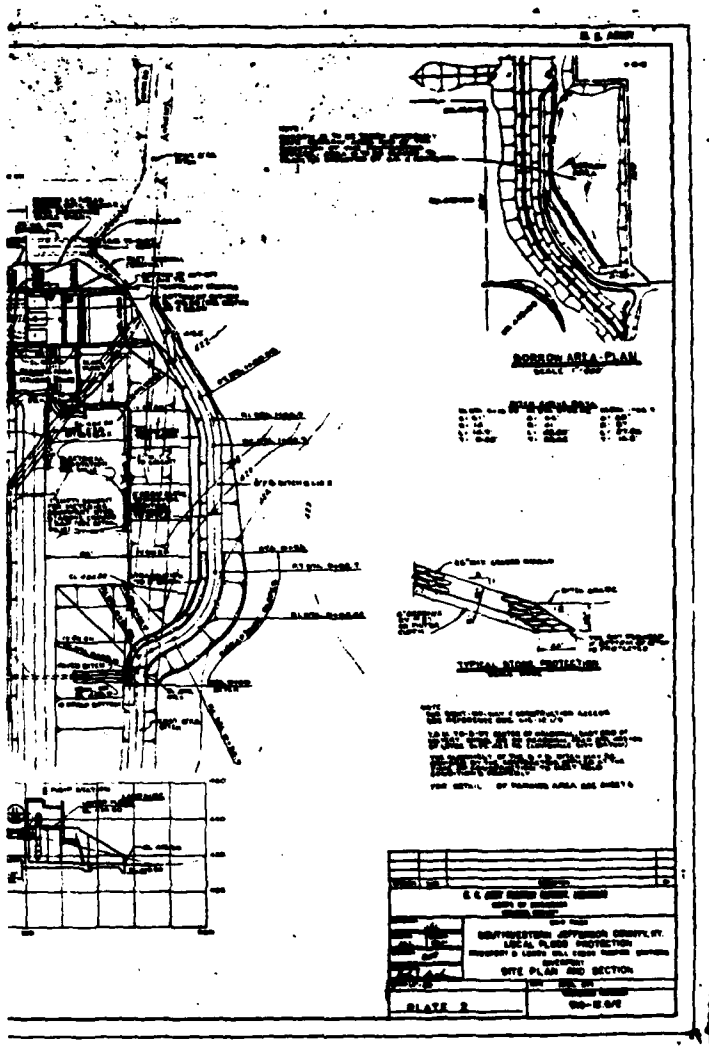
5-01 Conditions That Could Produce Problems.

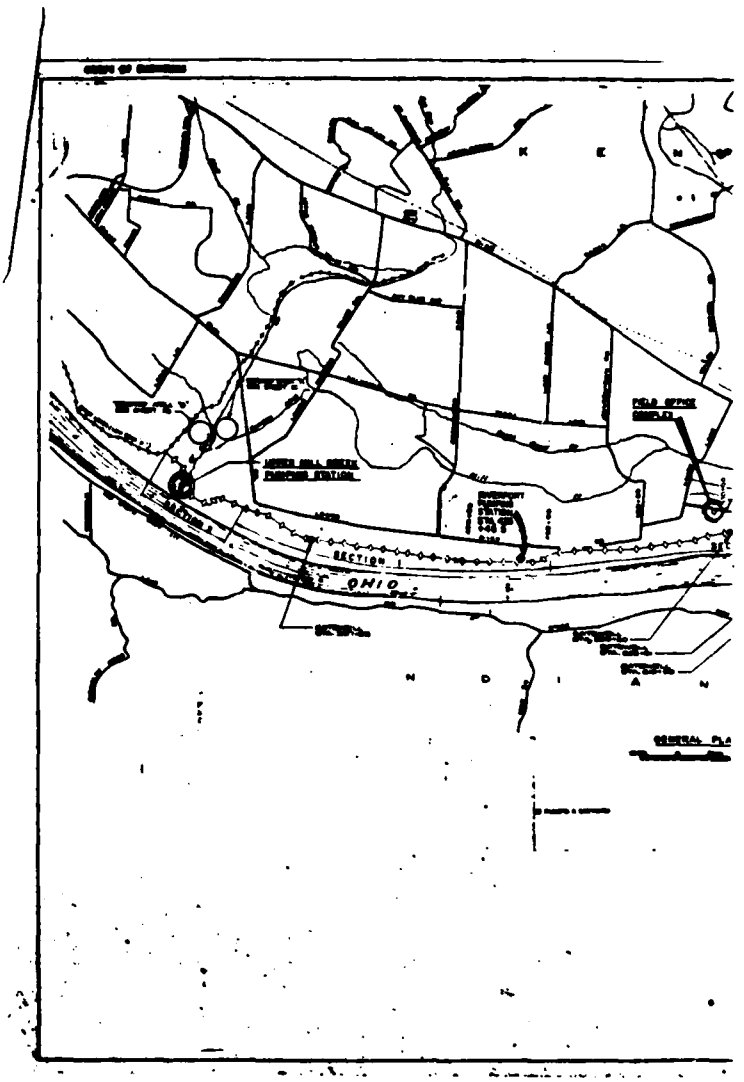
a. There were no founding conditions encountered on the pumping stations that are anticipated to produce future problems. The only conditions that deviated from planned conditions were discussed in paragraph 4-02 and that condition was corrected.

b. At the Upper Mill Creek Pumping Station, the heterogeneous material discussed in paragraph 2-01c was not entirely removed from beneath the electrical substation. Based upon a determination by personnel from Engineering Division, the electrical substation will be founded on a minimum of ten feet of suitable refill material placed over the heterogeneous material. It is not anticipated that this condition will produce a future problem but it is considered worthy of mention.

5-02 Recommended Observations. On yearly inspections and after every flood condition has receded, backfill around all plants should be monitored for any settlement or indications of problems. The silty, sandy material at the Riverport Station used for constructing the electrical substation foundation and for backfill at the pumping station should warrant specific observation. All subsurface drains should be inspected to insure that they are functional and not clogged; specific emphasis should be placed on the subsurface drainage system at the Upper Mill Creek Station. The electrical substation at the Upper Mill Creek Station should be monitored for any indication of settlement. It is also recommended that the structure walls at all stations be inspected for settlement cracking and the alignment of the discharge pipes be checked for settlement.




U. S. ARMY
BOSSIER AREA PLAN
TYPICAL LEVEE CROSS SECTION
SITE PLAN AND SECTION
PLATE 2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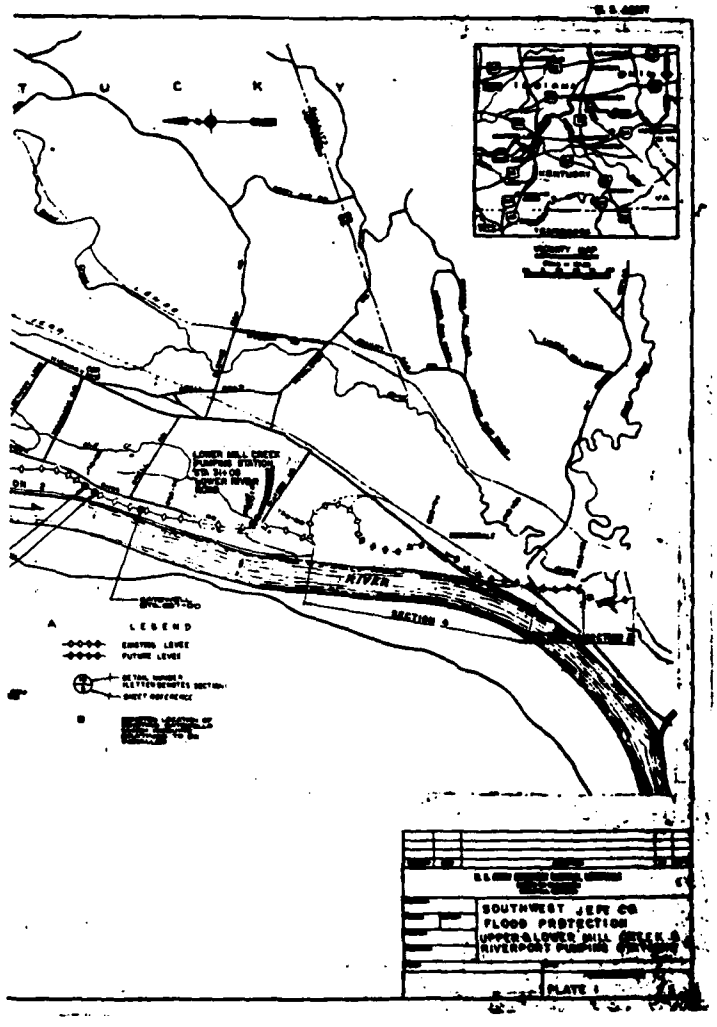
T U C K Y
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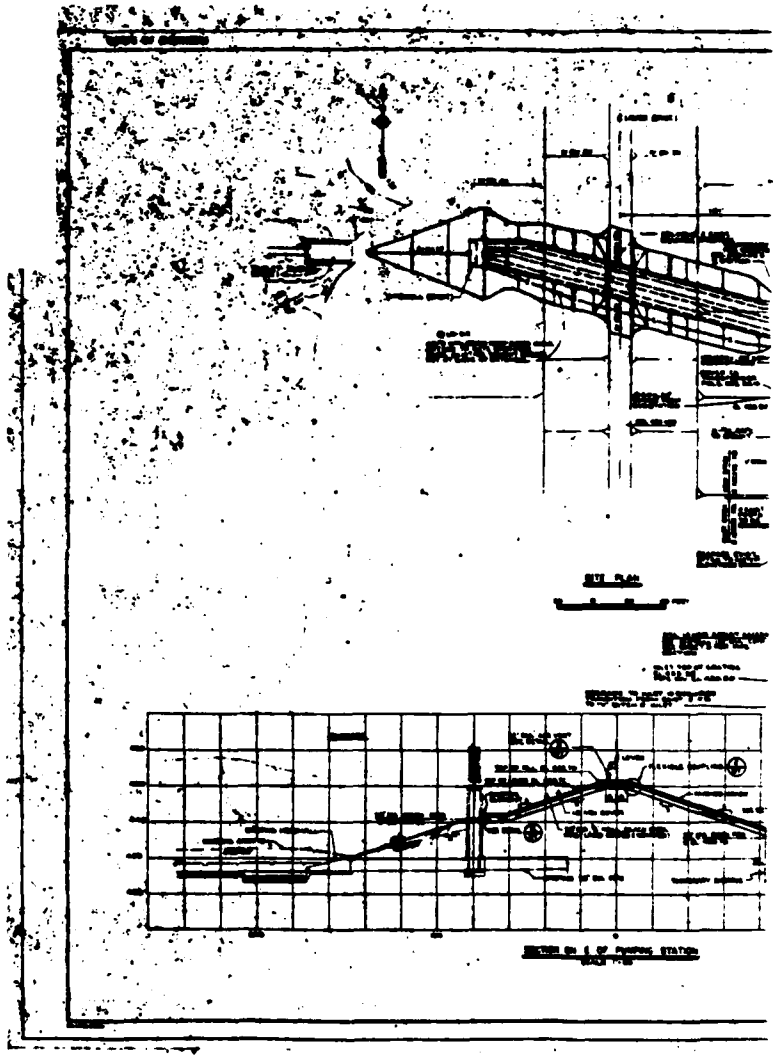
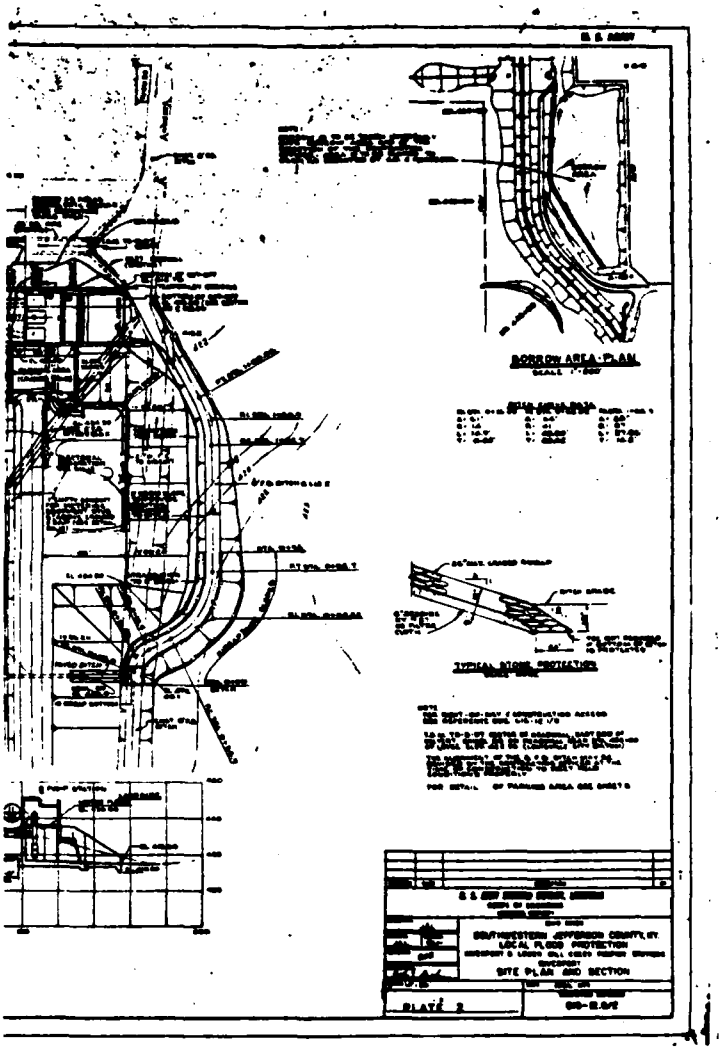
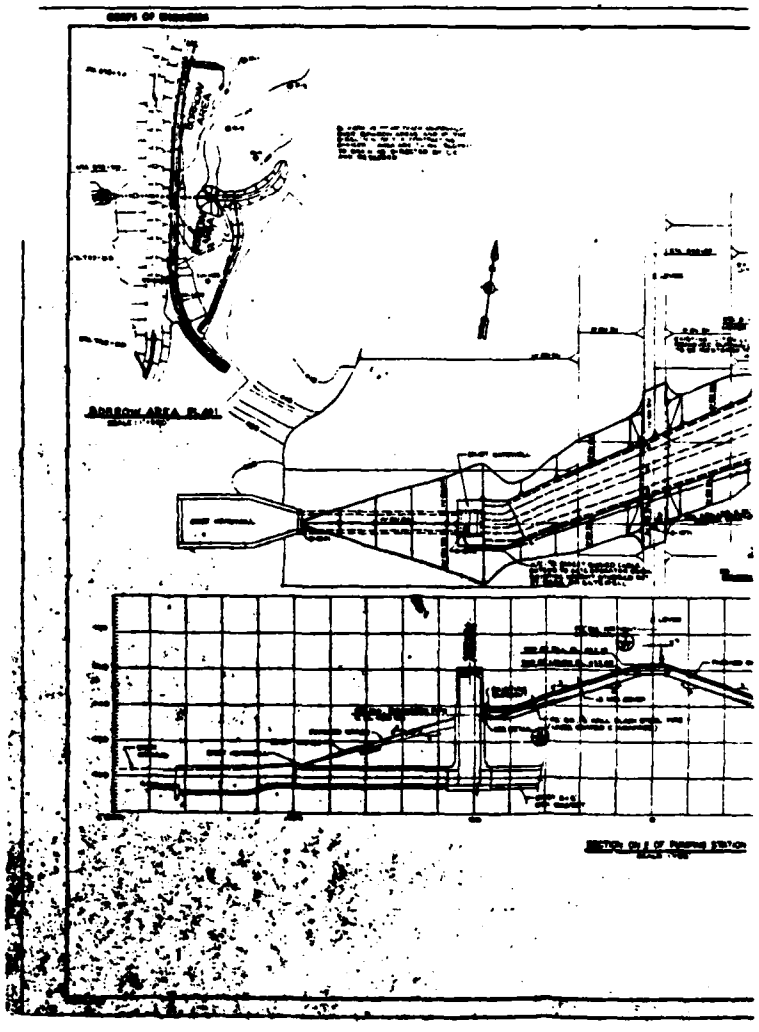
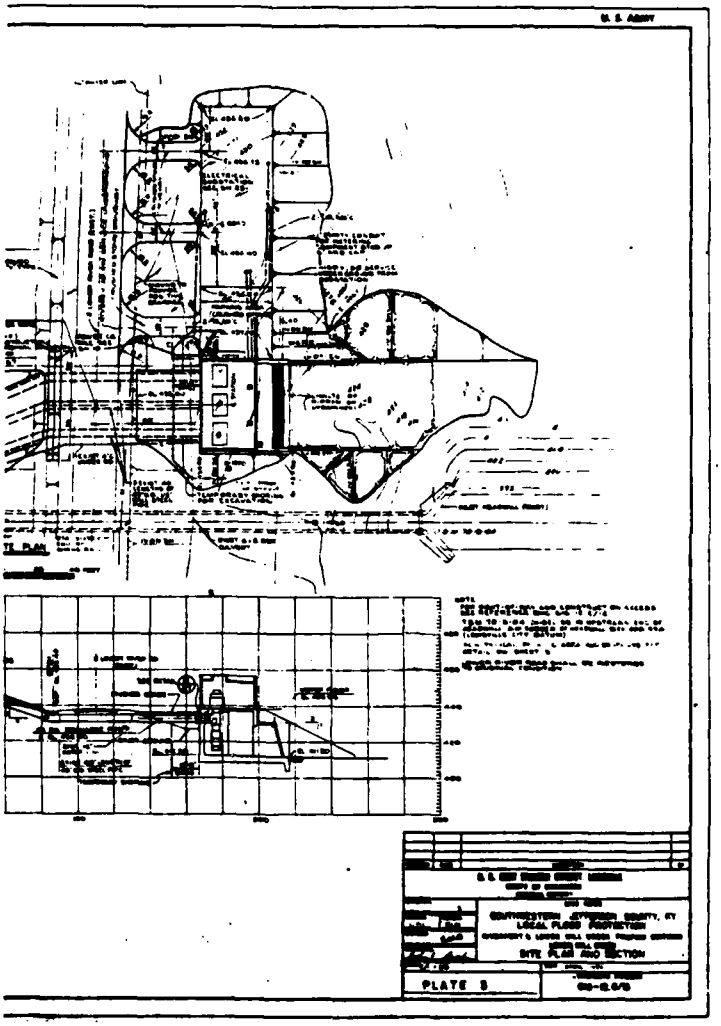
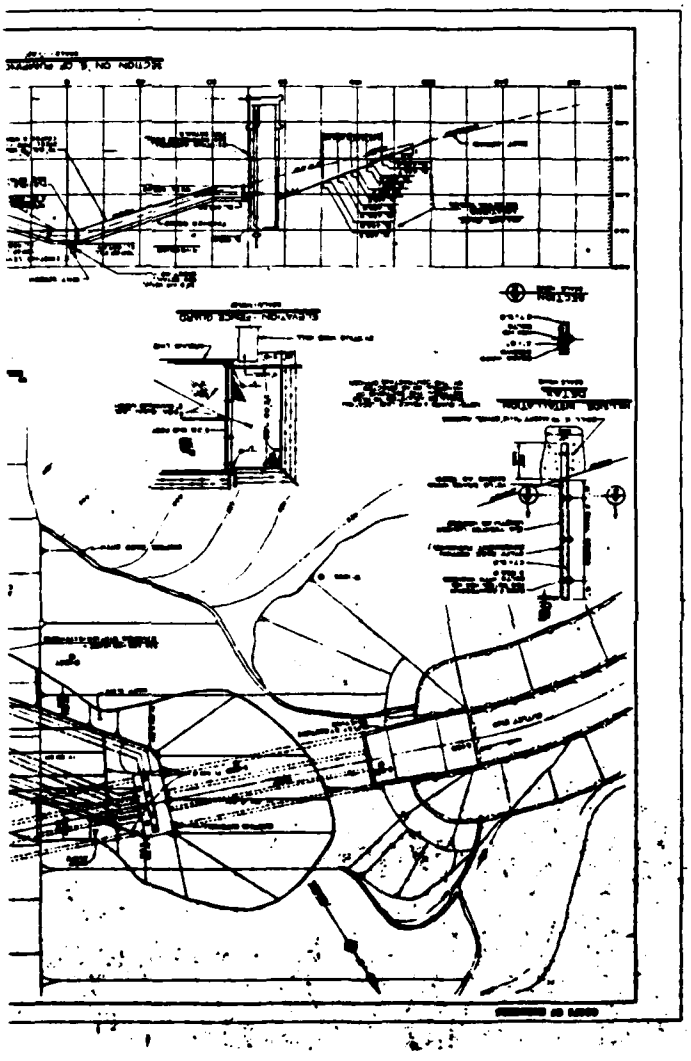
SOUTHWEST JEFF CO
FLOOD PROTECTION
PLATE 1

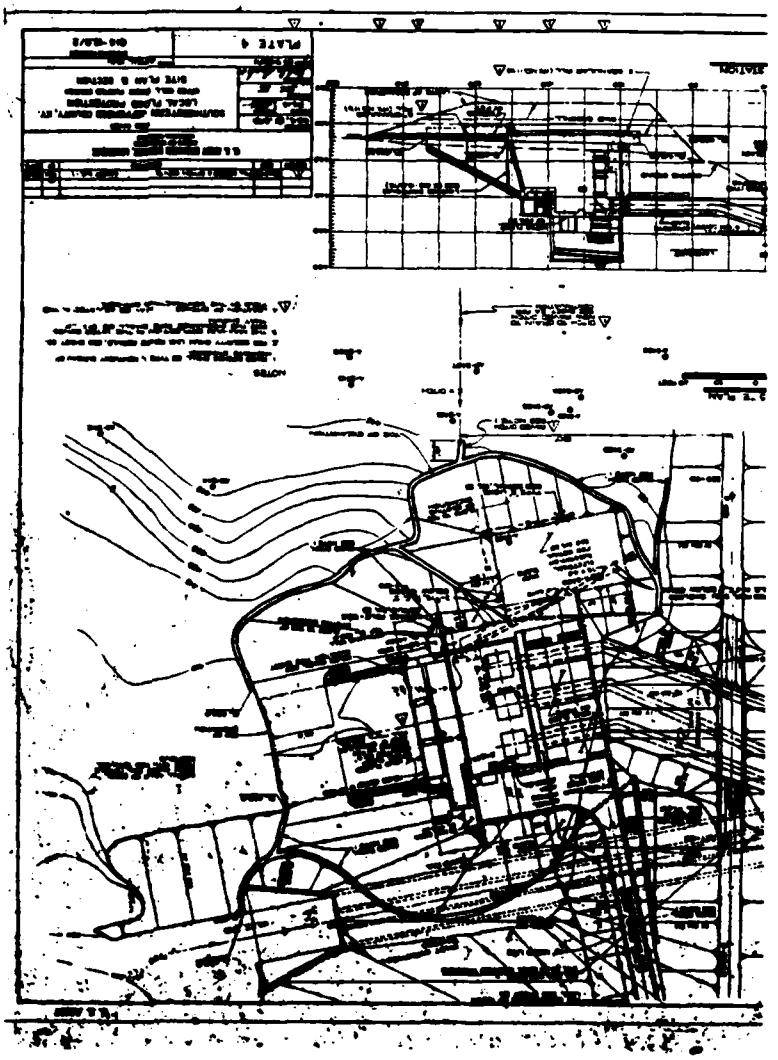


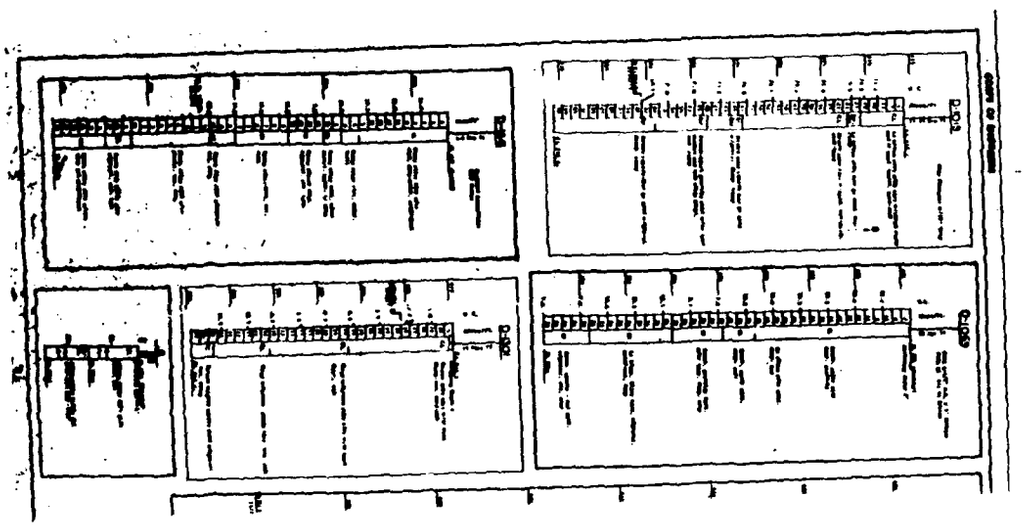

BORROW AREA PLAN
SOUTHWESTERN JEFFERSON COUNTY, KY.
LOCAL FLOOD PROTECTION
SITE PLAN AND SECTION
PLATE 2

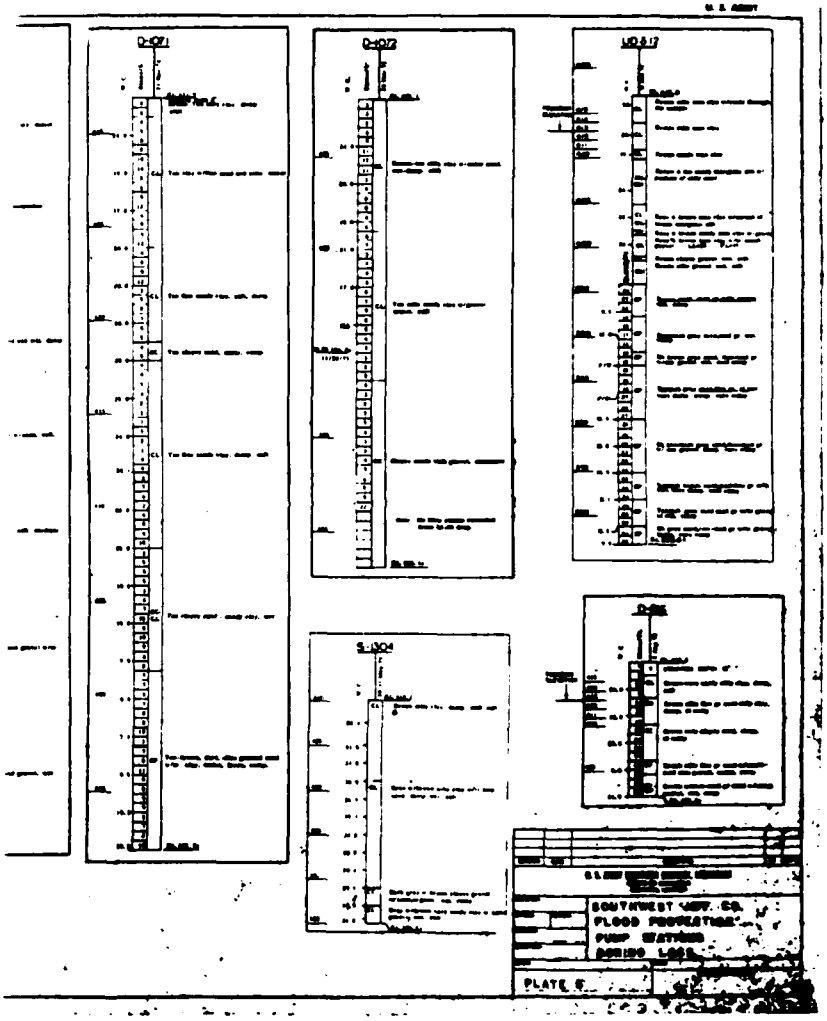



U. S. ARMY
PLATE 8





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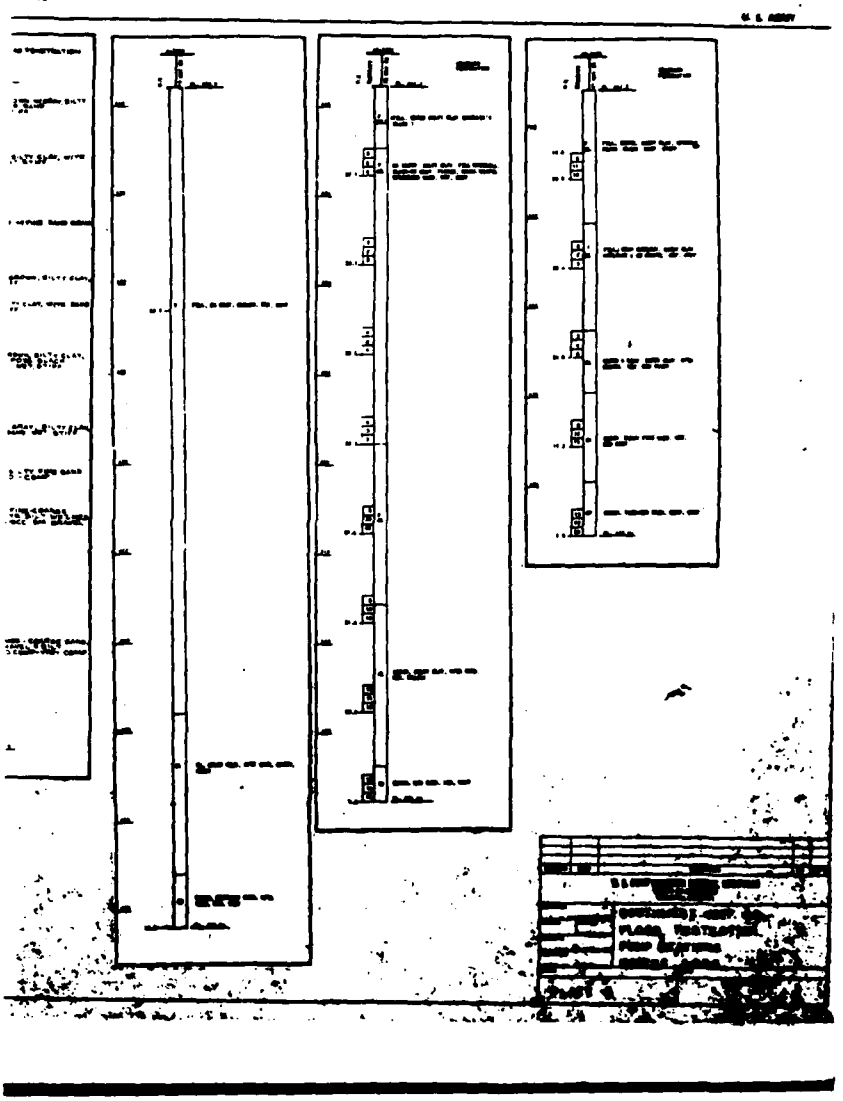

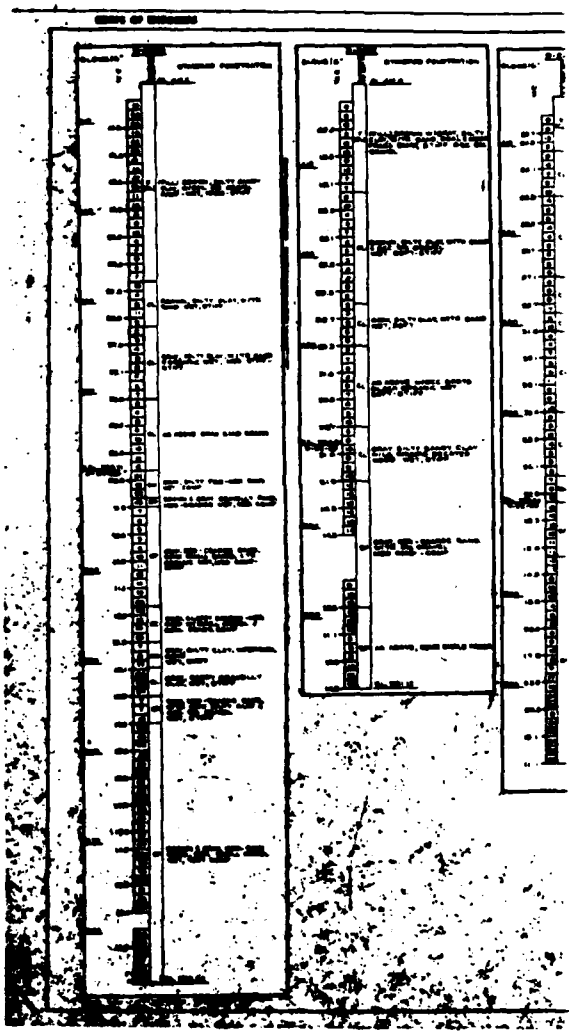

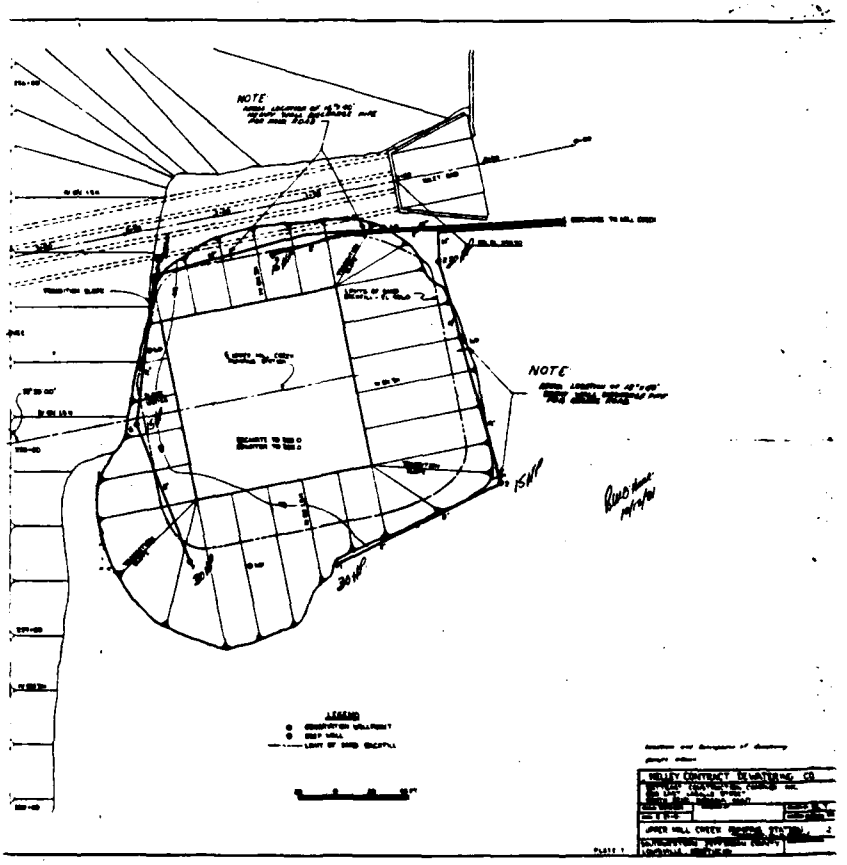
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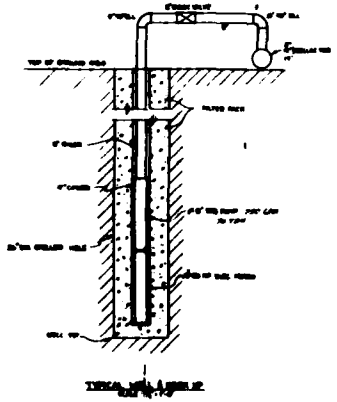
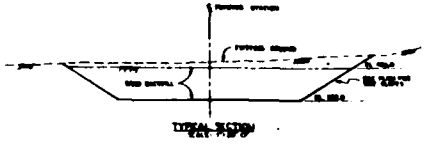
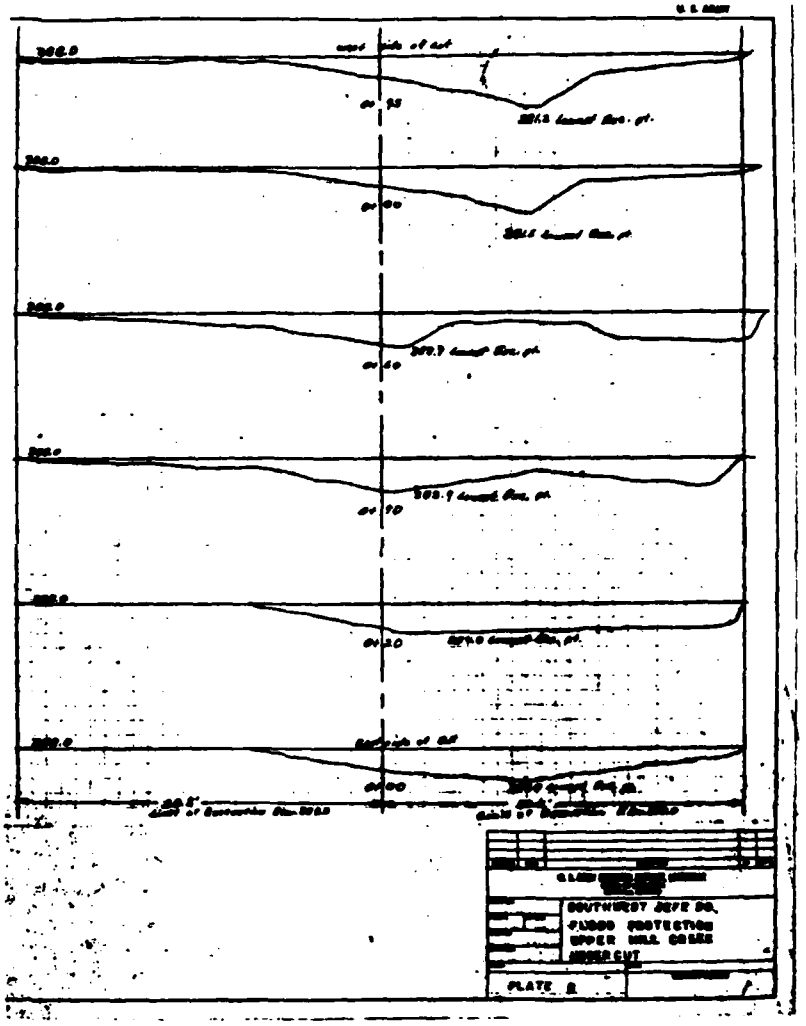
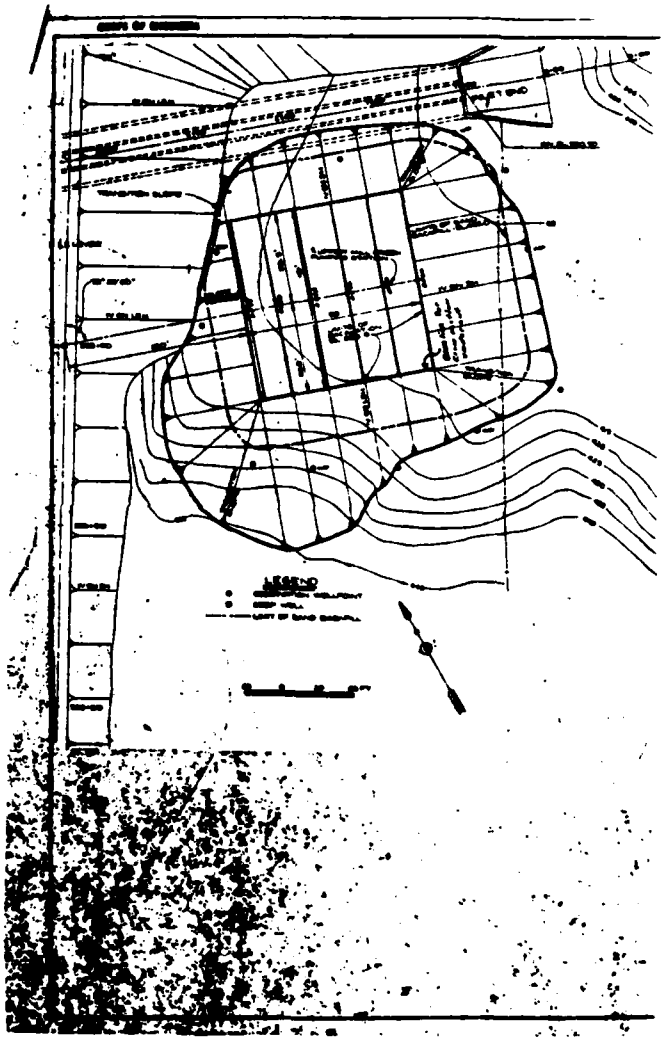
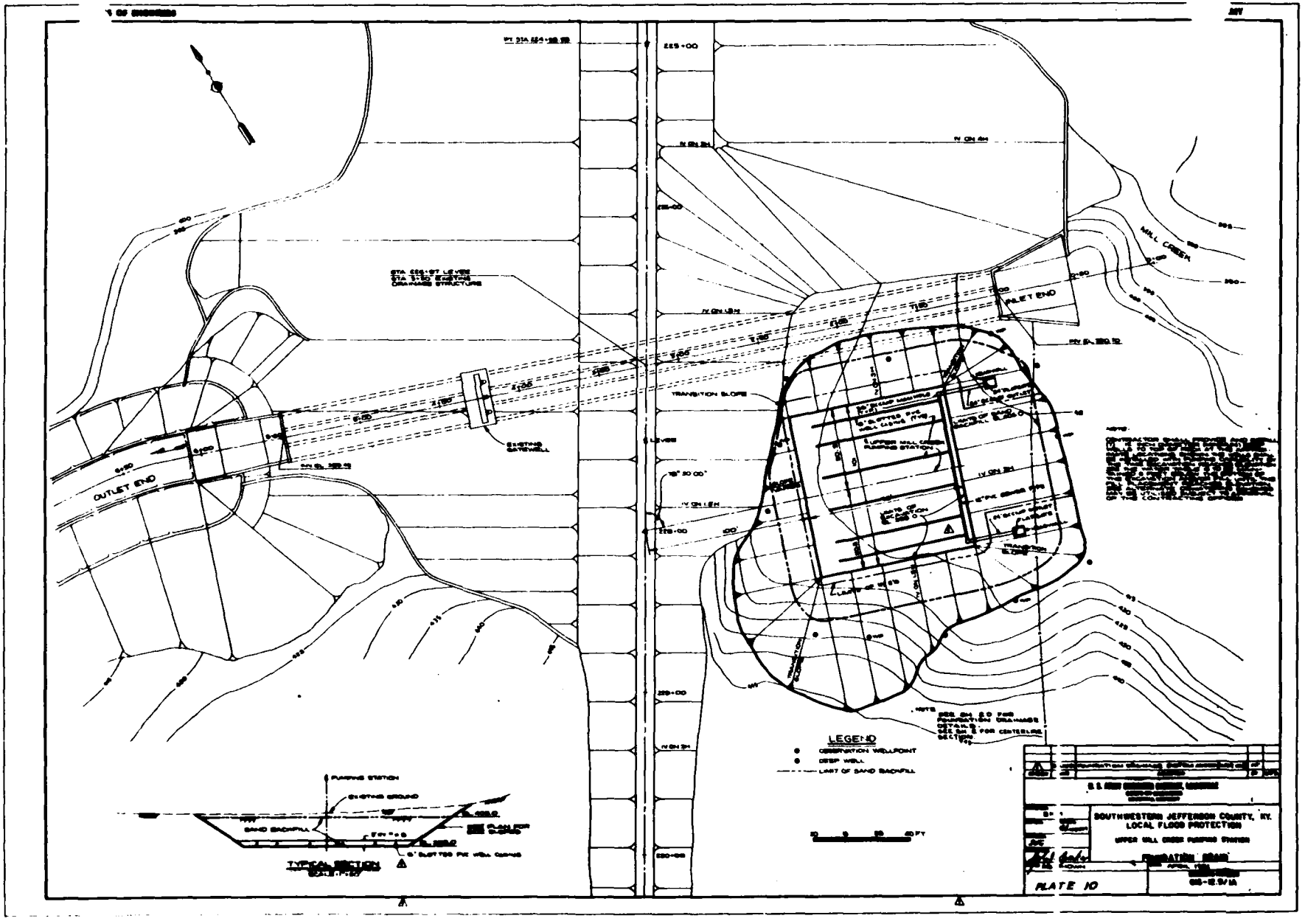





SOUTHWEST JEFF RD.
FLOOD PROTECTION
UPPER MILL CREEK
PLATE 8

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SAND BACKFILL
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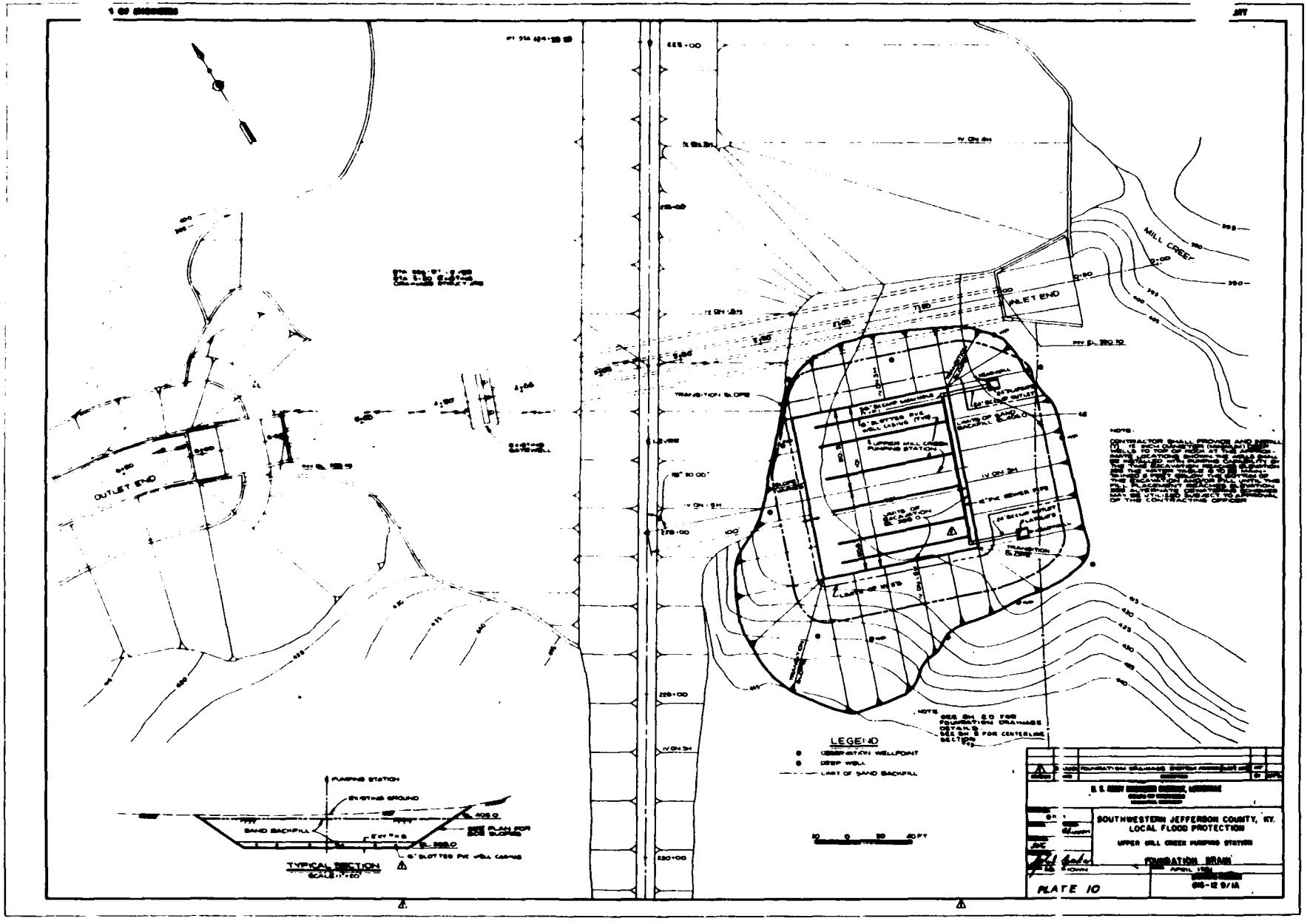
LOCAL FLOOD PROTECTION
UPPER MILL CREEK PUMPING STATION
FOUNDATION DRAIN
PLATE 10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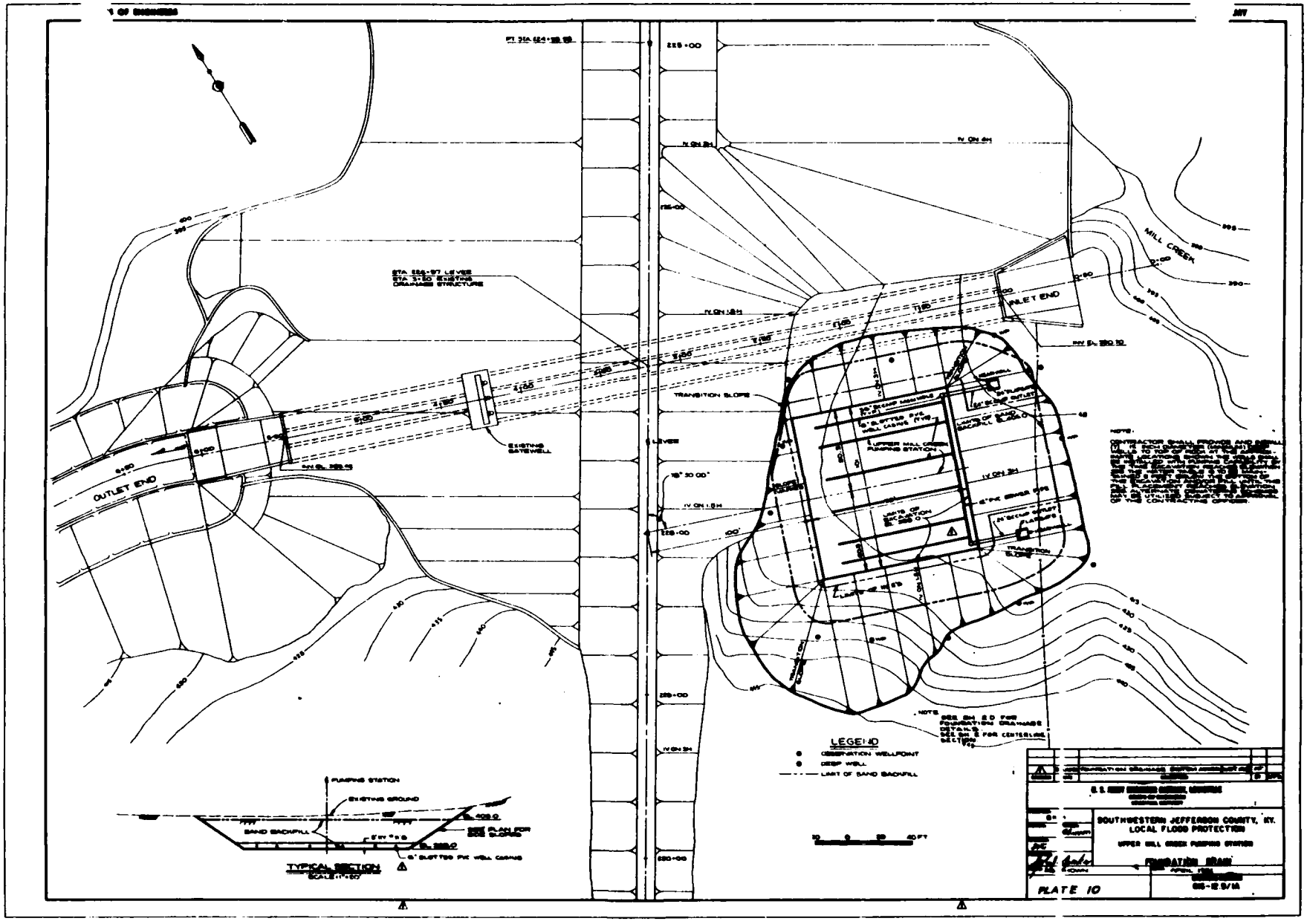
SOUTHWESTERN JEFFERSON COUNTY, KY.
LOCAL FLOOD PROTECTION
PLATE 10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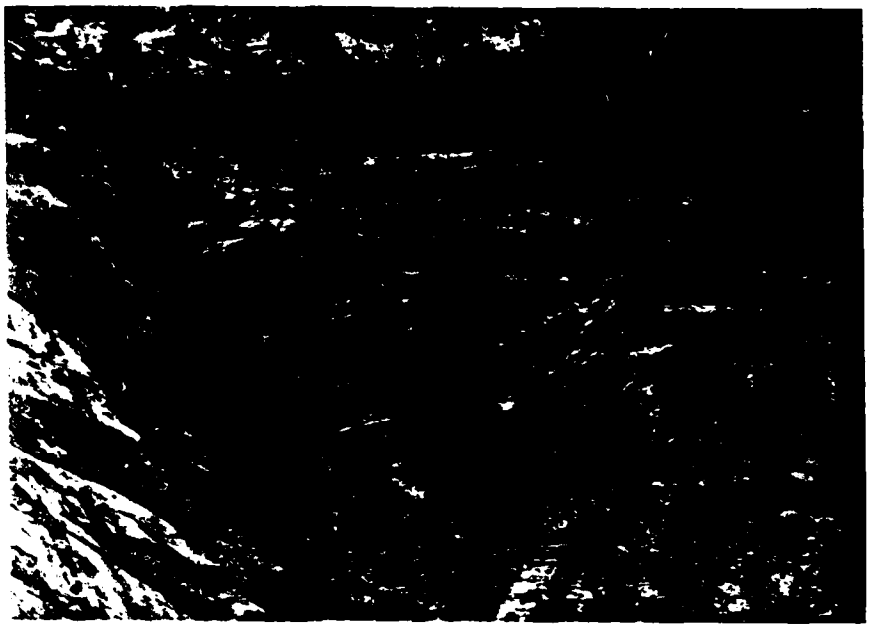
LEGEND
OBSERVATION WELLPOINT
DEEP WELL
LIMIT OF SAND BACKFILL
TYPICAL SECTION
SOUTHWESTERN JEFFERSON COUNTY, KY.
LOCAL FLOOD PROTECTION
PLATE 10

North Side Excavation at Elevation 388.0
UPPER MILL CREEK PUMPING STATION

East Side Excavation at Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Southeast Corner at Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Excavation Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

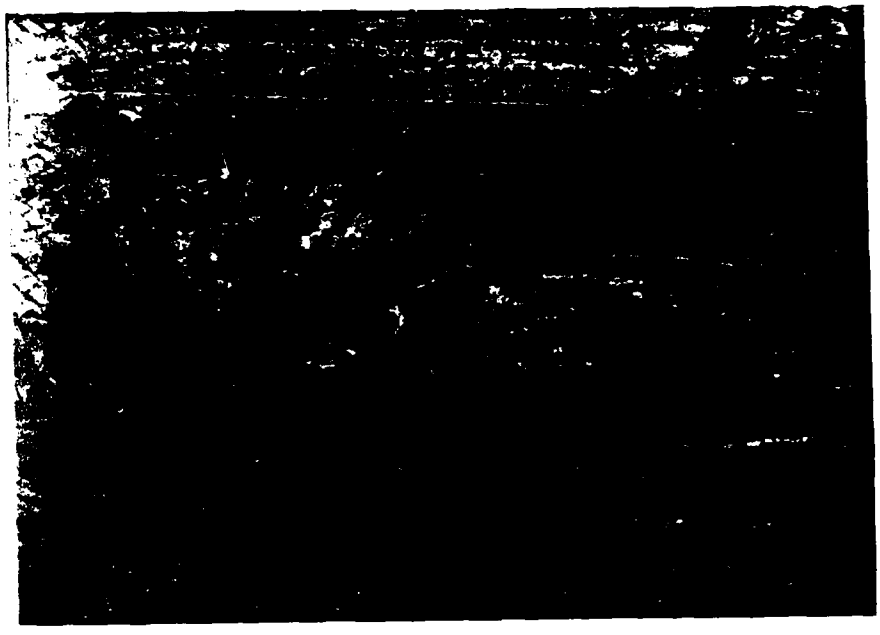


Southwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northeast Corner Excavation to 388.0 and Undercut
UPPER MILL CREEK PUMPING STATION

Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION



Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

North Side Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Southeast Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northeast Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Underuct Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northwest Corner Backfill Undercut to Elevation 388.0
UPPER MILL CREEK PUMPING STATION

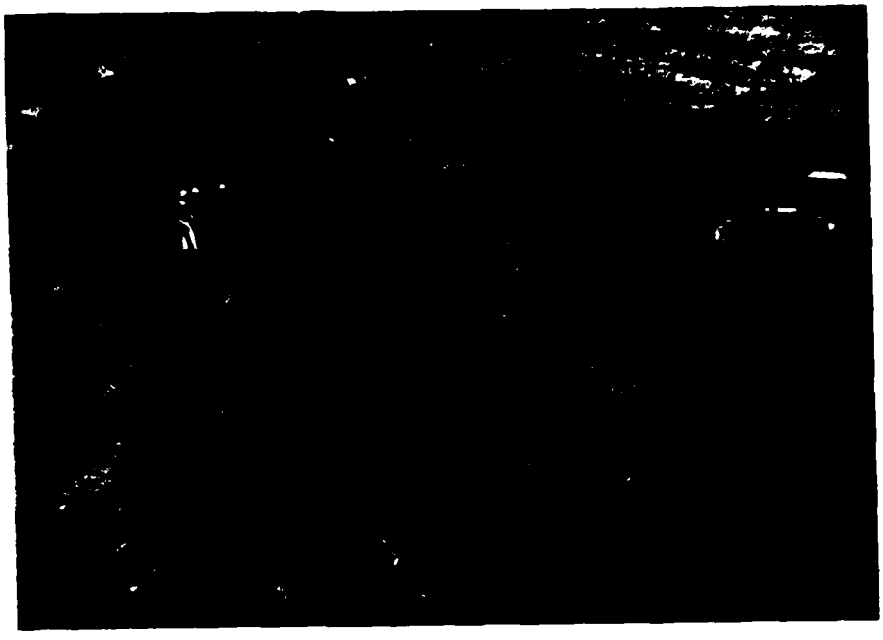
Southwest Corner Undercut Below Elevation 388.0
UPPER MILL CREEK PUMPING STATION

Northeast Corner Foundation Elevation 388.0
After Undercut and Refill
UPPER MILL CREEK PUMPING STATION

Northwest Corner Foundation Elevation 388.0
After Undercut and Refill
UPPER MILL CREEK PUMPING STATION

Southwest Corner Foundation Elevation 388.0
UPPER MILL CREEK PUMPING STATION

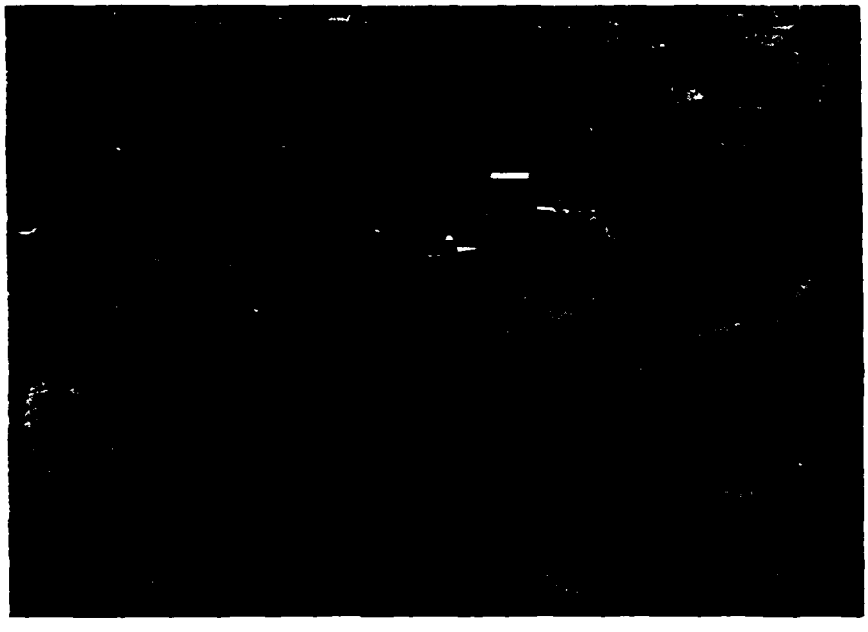
North Side Foundation Elevation 388.0
After Undercut and Refill
UPPER MILL CREEK PUMPING STATION



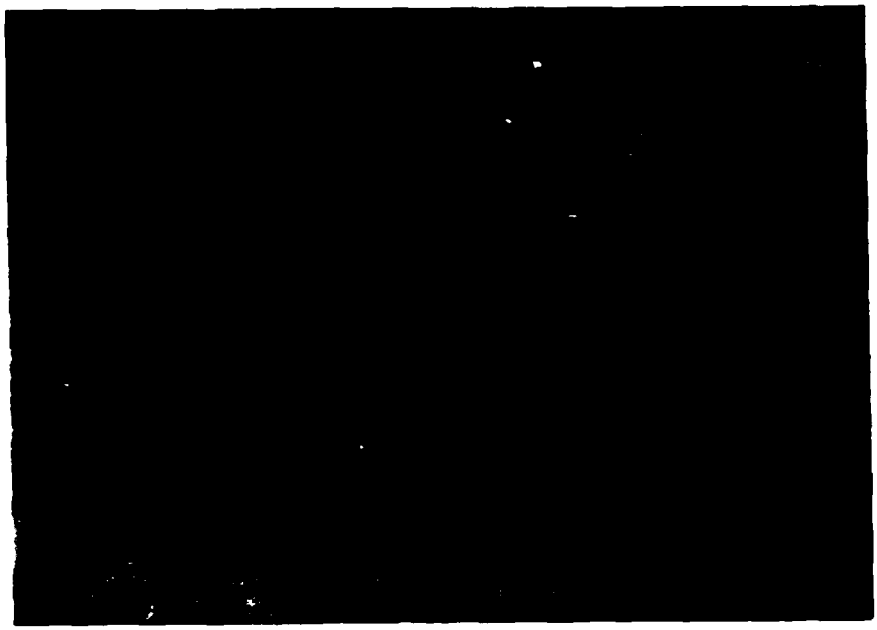
Northwest Corner Foundation Preparation
Elevation 388.0 After Refill Undercut
UPPER MILL CREEK PUMPING STATION

Northeast Corner Foundation Preparation
Elevation 388.0 After Refill Undercut
UPPER MILL CREEK PUMPING STATION

Southwest Corner Foundation Preparation
Elevation 388.0 After Refill Undercut
UPPER MILL CREEK PUMPING STATION

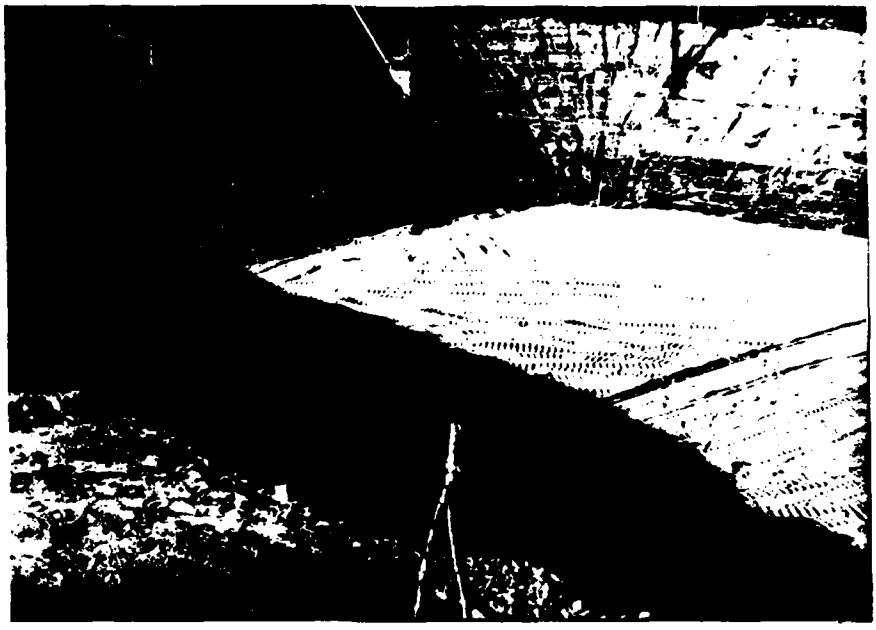


West Side Foundation Preparation
Elevation 388.0 After Refill Undercut
UPPER MILL CREEK PUMPING STATION

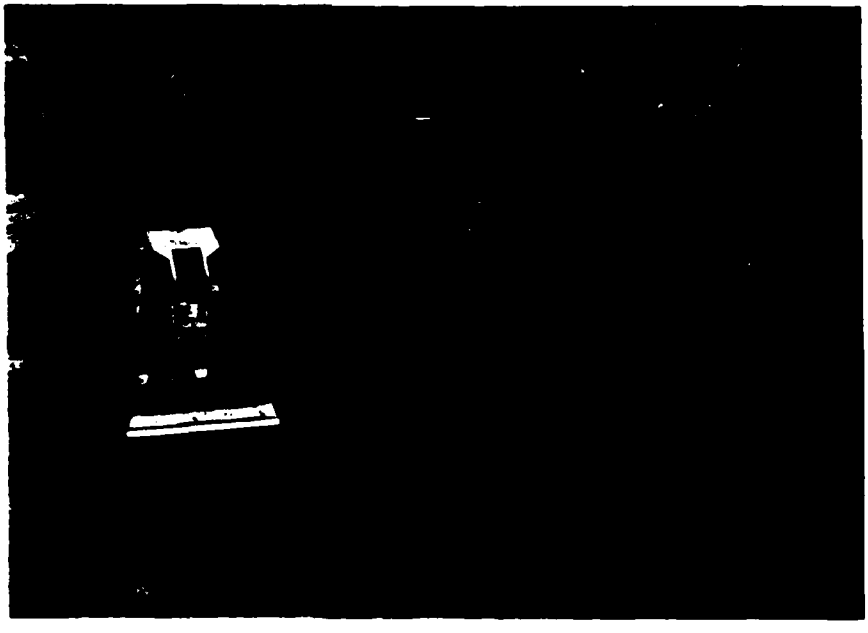


Northwest Corner Foundation Preparation
Elevation 388.0 After Refill of Undercut
UPPER MILL CREEK PUMPING STATION

Looking South Foundation Preparation
Elevation 388.0
UPPER MILL CREEK PUMPING STATION



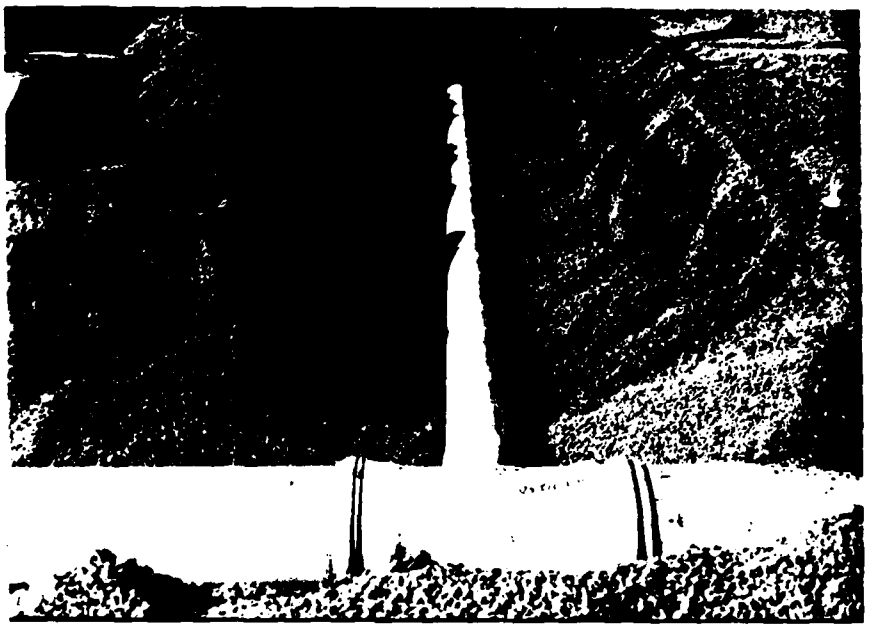
Stone Filter for Drainage System
UPPER MILL CREEK PUMPING STATION



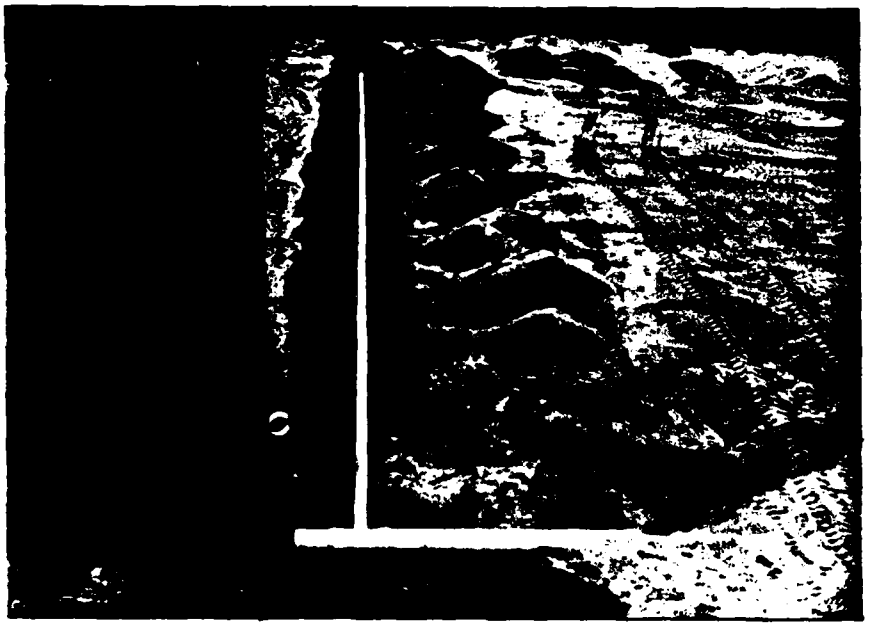
Northwest Corner Foundation Preparation
Elevation 388.0 After Refill of Undercut
UPPER MILL CREEK PUMPING STATION

Looking West Installation of Stone Filter Material
UPPER MILL CREEK PUMPING STATION

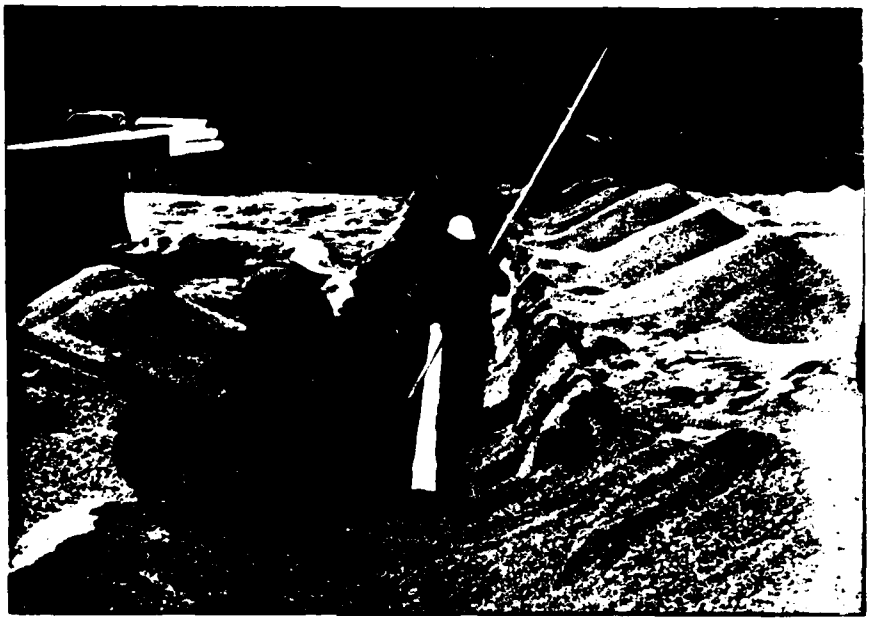
Northwest Corner Installation of Stone Filter Material
UPPER MILL CREEK PUMPING STATION



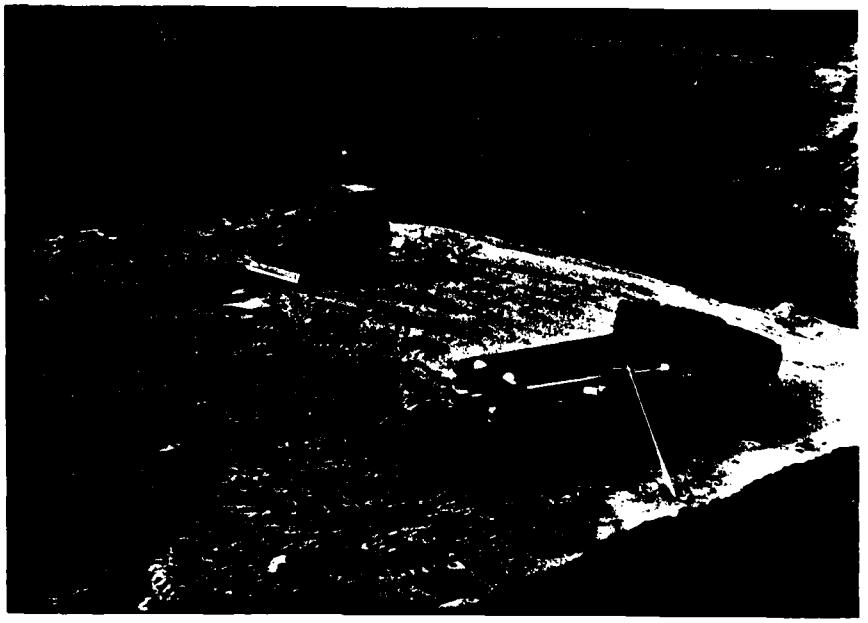
Looking West Installation of Lateral Drains
UPPER MILL CREEK PUMPING STATION



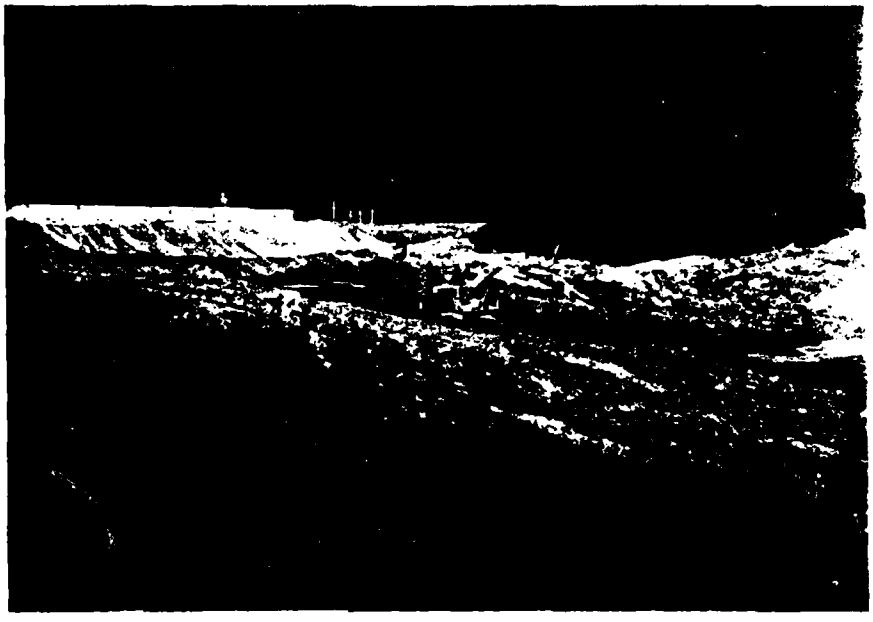
Installation of Lateral Drains
UPPER MILL CREEK PUMPING STATION



Installation of Lateral Drains
UPPER MILL CREEK PUMPING STATION

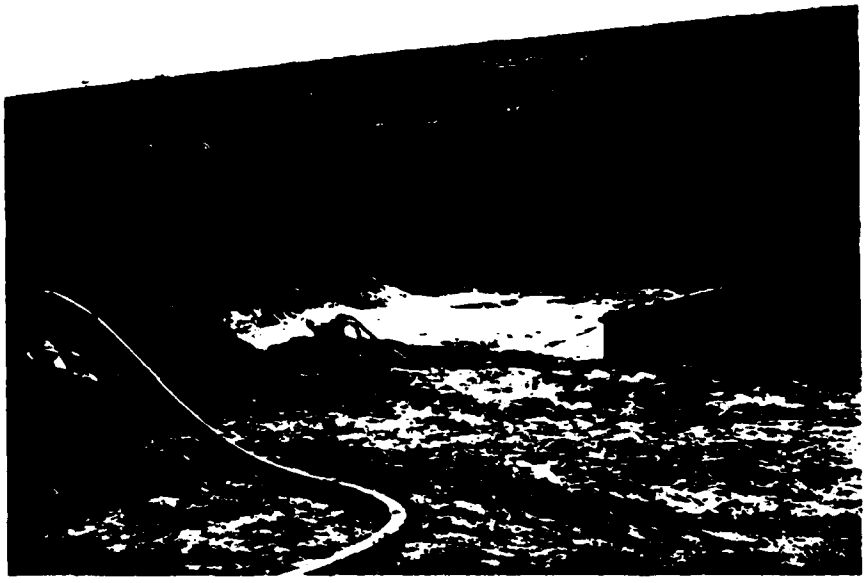


Stone Filter Material
UPPER MILL CREEK PUMPING STATION



Excavation of Foundation
LOWER MILL CREEK PUMPING STATION

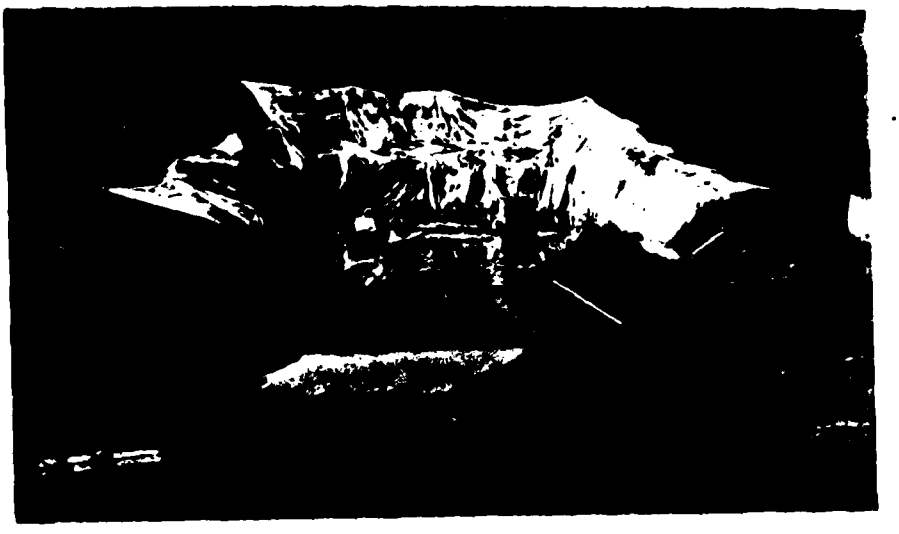
Foundation
LOWER MILL CREEK PUMPING STATION



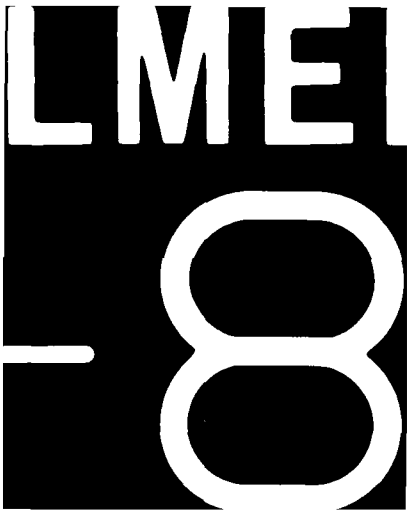
Foundation
RIVERPORT PUMPING STATION

Foundation for Electric Substation
RIVERPORT PUMPING STATION

Foundation and Borrow Area
RIVERPORT PUMPING STATION



Foundation
RIVERPORT PUMPING STATION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